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United States Patent [19]

Fujii et al.

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[54] **LIQUID CRYSTAL DISPLAY WITH SUBSTANTIALLY EQUAL RESISTANCES FOR SETS OF TERMINAL ELECTRODES AND INCLINED WIRING ELECTRODES**

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[30] Foreign Application Priority Data

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[52] U.S. Cl. **349/149; 349/143; 349/150; 349/152**

[58] Field of Search **349/143, 152, 349/150, 149**

[56] References Cited**U.S. PATENT DOCUMENTS**

4,515,647 5/1985 Sasaki et al. 349/152

5,402,255	3/1995	Nakanishi et al.	349/150
5,555,116	9/1996	Ishikawa et al.	349/143
5,572,346	11/1996	Sakamoto et al.	349/150
5,668,700	9/1997	Tagusa et al.	349/150
5,680,191	10/1997	Voisin et al.	349/150
5,734,458	3/1998	Ikubo et al.	349/152
5,737,053	4/1998	Yomogihara et al.	349/150
5,742,074	4/1998	Takizawa et al.	349/152
5,906,071	3/1990	Takahara et al.	349/152

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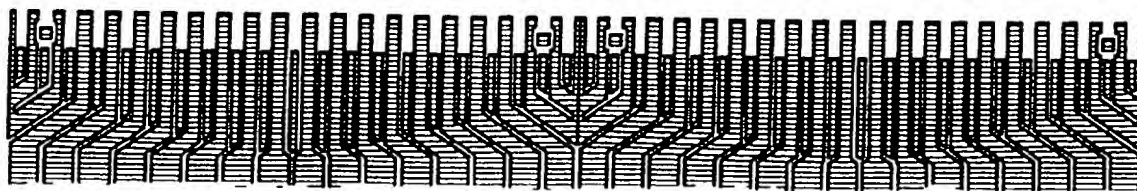
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[57] ABSTRACT

A liquid crystal display including a plurality of parallel display electrodes wired over an electrode substrate, terminals for the display electrodes led out to the end portion of the electrode substrate and connected to TCPs, the terminals having pitches smaller than those of the display electrodes, and leadout wirings for connecting the display electrodes and the terminals. The leadout wirings each consist of a portion extending from a respective display electrode as it is, a portion extended from the respective terminals as it is, and almost parallel, inclined linear wiring that connects the two extended portions. The length of the two extended portions and the width of the inclined linear wiring are adjusted so that the wiring resistances of the individual leadout wirings are substantially equal.

24 Claims, 27 Drawing Sheets



ABSTRACT

A liquid crystal display including a plurality of parallel display electrodes wired over an electrode substrate, terminals for the display electrodes led out to the end portion of the electrode substrate and connected to TCPs, the terminals having pitches smaller than those of the display electrodes, and leadout wirings for connecting the display electrodes and the terminals. The leadout wirings each consist of a portion extending from a respective display electrode as it is, a portion extended from the respective terminals as it is, and almost parallel, inclined linear wiring that connects the two extended portions. The length of the two extended portions and the width of the inclined linear wiring are adjusted so that the wiring resistances of the individual leadout wirings are substantially equal.